## Space Weather Forecast

Issued on Saturday, 17 September 2022 at 13:07 Local

**This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

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**Space Weather Forecast Headline: Now reduced chance of Moderate-class X-ray flares. Slight Chance Minor Geomagnetic Storm G1 into new UTC working week.**

**Analysis of Space Weather Activity over past 24 hours**

**Solar Activity:** Solar activity was Moderate over the past 24 hours, with a moderate-class X-ray flare originating from the large and complex sunspot region now rotated around the northwestern solar horizon. This was the second of a pair of M-flares (the first just prior to the start of this period), peaking at 16/1559UTC. Neither of these events appears to have spawned either a solar radiation storm or Coronal Mass Ejections (CMEs).

There are currently three sunspot regions on the visible disc, with the large, complex group in the northwest having now crossed the limb. The group in the southeast quadrant saw further growth in its trailing portion, and is now the most complex group. The other two groups are smaller and simpler.

Satellite imagery for the 24 hours was dominated by a pair of 'filament eruptions' (arcs of plasma leaving the Sun) from the southwest, starting around 15/2100UTC and 16/0100UTC. Of these, the latter was the more impulsive and violent, and as a result appears to have consumed the former in imagery. These features have been analysed as a unified CME, with a possible glancing blow of Earth expected late in the UTC day of Sunday 18 September.

**Solar Wind / Geomagnetic Activity:** The solar wind was on a generally flat trend, fluctuating within normal background levels. The number of particles comprising the solar wind was at average levels. The magnetic field associated with the particles was weak, with the north-south component similarly weak, with only brief periods of southward orientation. Geomagnetic activity was Quiet (Kp 0 to 1).

**Energetic Particles / Solar Radiation:** Solar radiation remained slightly elevated above background levels over the 24 hours, less than 3pfu (where 10pfu is S1) and on a flat trend.

**Four-Day Space Weather Forecast Summary**

**Solar Activity:** Solar activity is expected to fall with the passing of the recent largest spot group, although for day one it probably remains near enough the front side to throw X-ray producing ejecta clear of the horizon to give a peak chance of moderate-class X-ray flares for the four days. No notable regions are due over the eastern solar horizon to counteract this fall.

**Solar Wind / Geomagnetic Activity:** There is one unified CME that features in the current forecast - the product of two 'filament eruptions' starting 15/2100UTC and 16/0100UTC from the southwest. These may give a glancing blow late in the UTC of Sunday 18 September, and a corresponding Slight Chance of Minor Geomagnetic Storm G1.

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The forecast coronal hole fast wind is overdue and correspondingly is now expected to be more muted, perhaps greatest should it arrive concurrently with the above CME - at the end of the current UTC weekend.

Initially quiet conditions may rise to a slight chance of Minor Geomagnetic Storm G1 late Sunday 18 and through Monday 19 September, returning to quiet on Tuesday.

**Energetic Particles / Solar Radiation:** The chances of S1+ level solar radiation storms are slightly elevated given the already enhanced near-Earth environment, although the trend is downwards as the most liable spot to produce such events rotates away from a favourable position in the period.

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**Geomagnetic Storms:**

| Geo-Magnetic Storm Probability (Exceedance) | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Minor or Moderate | G1 to G2 | No | 1 | 20 | 20 | 1 |
| Strong | G3 | No | 1 | 1 | 1 | 1 |
| Severe | G4 | No | 1 | 1 | 1 | 1 |
| Extreme | G5 | No | 1 | 1 | 1 | 1 |

**Radio Blackouts - X Ray Flares:**

| X Ray Flares Probability | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | R1-R2 M Class | Yes | 30 | 20 | 20 | 20 |
| Very Active | R3 to R5 X | No | 5 | 1 | 1 | 1 |

**Solar Radiation Storms - (High Energy Protons):**

| Radiation Storms Probability (Exceedance) | Level ($cm^{-2}$ $sr^{-1}$ $s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | ≥ S1 | No | 15 | 10 | 5 | 5 |
| Very Active | ≥ S3 * | No | 1 | 1 | 1 | 1 |

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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